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PSYCHE

VOL. XXIV AUGUST, 1917 No. 4

EIGHT NEW MALLOPHAGA OF THE GENUS LIPEURUS FROM NORTH AMERICAN BIRDS.

By E. A. McGregor,

Bureau of Entomology, U. S. Department of Agriculture.

Lipeurus brevicephalus sp. nov.

Two females, two males, and two immature individuals (McGregor No. 101, Washburn No. 166) from sand-hill crane (Grus mexicana), western Minnesota, April 15, 1894.

This species is nearest *L. hebræus* N. (from *Grus cinera* and *G. pavonina*) from which it is very distinct. It also superficially resembles *L. toxoceros* N. which is from an entirely different host.

Description of Male. Total length, 4.76 mm.; length of head, 1.045 mm.; length of prothorax, .357 mm.; length of metathorax, .797 mm.; length of abdomen, 2.585 mm.; width of head across temples, .907 mm.; width of prothorax, .660 mm.; width of metathorax, .962 mm.; width of abdomen, .990.

Head slightly longer than wide, rather abruptly narrowed anteriorly, with a truncate frontal margin, antennal sinuses very shallow, temples some what rounding, eyes strongly projecting, hindhead widest half way between the eyes and the posterior angles, occipital margin strongly concave, four long marginal hairs and two short ones before the antennal angle, a prickle arises from the eye, one longish hair and five prickles on the temporal margin, and a pair of prickles arise dorsally from the forehead; head pale, antennal bands arise just before the antennæ and are lost in the colored areas which extend laterally from the mandibles, but reappear as narrow borders behind the eyes. What appear to be faint occipital bands extend toward the bases of the mandibles. Antennæ with segment 1 greatly swollen and equal to all the other segments; segment 3 with a dorsal, distal appendage and with a dorsal, proximal, annulated gland.

Thorax one-fifth longer than wide. Prothorax trapezoidal, with posterior margin nearly straight. A weak spine at the posterior lateral angle. Metathorax at first converges slightly and then widens to the abdomen; posterior margin twice weakly concave forming a weak median angle; a series of five long hairs in the posterior angles, and on each side between the latter and the middle a series of four similar hairs; central and hind portion of prothorax and central portion of metathorax yellow-amber colored. Legs ample, yellowish, pale margined.

Abdomen slender, elongate, slightly widening to segment 5, then tapering gradually to segment 9; segment 1 conspicuously shorter than the others; segments 2 to 8 with transparent lateral plates immediately within which occur longitudinal bands of darker color; general color pale amber. Segment 2 with a short spine at the posterior angles; segment 3 with three similar spines at the posterior angles; segment 4 with a spine and a longer hair at the posterior angles; segment 5 with one long and two shorter hairs at angles; segment 6 with three shortish hairs at angles; segment 7 with three longish hairs at angles; segment 8 with two longish hairs at the posterior lateral angles, one just within the lateral plate, and four along the posterior border; segment 9 very deeply notched, forming a pair of terminal claw-like appendages at the inner borders of which near the base are a pair of shortish hairs, while a series of six short hairs occur laterally thereon.

Type: Catalogue No. 21369, U. S. Nat. Museum.

Lipeurus crotophagæ sp. nov.

One female (Bishopp No. 916) from groove-billed ani (*Crotophaga sulcirostris*), Victoria, Mexico, December 10, 1909, collector F. C. Bishopp.

Not much resembling *L. macgragori* Kell. from same host, but probably nearest *L. variegatus* Neumann and *L. picturatus* Kell. The present species is very distinct from all of these.

Description of Female. Total length, 1.44 mm.; length of head, .455 mm.; length of prothorax, .104 mm.; length of metathorax, .182 mm.; length of abdomen, .832 mm.; width of head, .429 mm.; width of prothorax, .260 mm.; width of metathorax, .364 mm.; width of abdomen, .598 mm.

Head roughly pentagonal, a trifle longer than wide, converging abruptly to a narrow frontal margin bordered on each side by two shortish hairs. Between the trabeculæ, which are quite prominent, and the frontal border five prickles arise. Antennal sinuses hardly noticeable. Ocular projections barely discernible; ocular fleck conspicuous. Temple margins diverge slightly posteriorly to the squarish angles which bear a strong spine; a prickle arises from the eye, and two from the temples. Occipital margin almost straight, but with a weak median convexity. Antennal bands clearest just before the antennæ, paling anteriorly and separated at front by the large, median, dark-bordered clear area which extends back to the mandibles. Temples narrowly margined by blackish borders. Faint bands running backward from the trabeculæ and the mandibles unite posteriorly to form a W-shaped figure. A diamond-shaped occipital signature. Antennæ conventional.

Thorax one-fourth wider than long, prothorax rectangular with very slightly convex posterior margin. A short spine at each posterior lateral angle. Smoky-amber color with a median clear area, and with narrow, dark, underlying bands. Metathorax pentagonal, sides diverging strongly to the angulated posterior margin. A strong postulated spine at the lateral posterior angle, and four long, postulated hairs along each lateral third of the hind border. Color smoky-brown, with a median, vase-shaped, clear area. Legs smoky banded.

Abdomen widely elliptical, widest on the fourth segment. General color hyaline with a dorsal series of paired, sub-quadrate, brownish plates, and with lateral plates of slightly darker color on segments 2 to 7 inclusive; the dorsal plates on segment 1 larger and darker than others. Marginal hairs at posterior lateral angles as follows: Two weak hairs on segment 3, two longer ones on segment 4, two long hairs on each of segments 5, 6, 7 and 9, one long hair on segment 8. A median pair of long spines on segments 1 to 8 inclusive. A pair of weak terminal hairs. Segmental sutures mostly invisible.

Type: Catalogue No. 21363, U. S. Nat. Mus.

Lipeurus mississippiensis sp. nov.

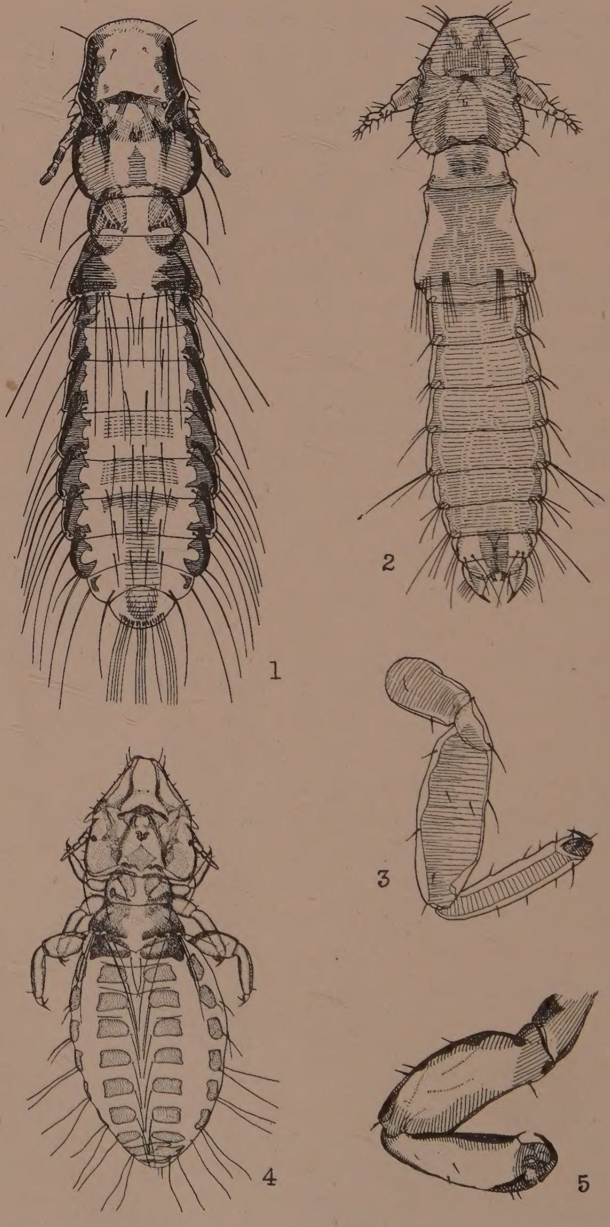
One female (Bishop No. 4053) from flicker, Hamburg, Miss., December 24, 1914, coll. W. E. Dove.

This conspicuously marked species is nearest *L. snodgrassi* Kell. (of humming-bird) and *L. stramineus* Denny (of woodpecker), but from both of these our species is very distinct.

Description of Female. Total length, 1.62 mm.; length of head, .477 mm.; length of prothorax, .108 mm.; length of metathorax .162 mm.; length of abdomen, .882 mm.; width of head across temples, .342 mm.; width of prothorax, .270 mm.; width of metathorax, .360 mm.; width of abdomen, .432 mm.

Head fully a third longer than wide, rhombic-rectangular in outline, forehead slightly narrowed to the wide, rounded front, temples converging rotundately to the very slightly concave occiput. Antennal sinuses rather shallow. Trabeculæ quite prominent. Ocular projections not very noticeable. Antennal bands extremely conspicuous as wide, dark areas bordering the forehead, but paling anteriorly and interrupted across the frontal margin by the large, quadrilateral, clear area before the mandibles; continuing paler around the antennal bases to the temporal marginal bands which are as dark as the antennal bands but somewhat narrower; both of these bands are bordered inwardly by conspicuous pustulations. Occipital border without color. Backward pointing bars resembling occipital bands extend from the antennal bands part way to the occiput. An obelisk-shaped occipital signature plainly visible. A strong hair at each angle of the frontal border, two shorter hairs before each trabecula, a prickle on the eye, two long hairs on the hind portion of temples, a pair of prickles dorsally on the forehead, and a similar pair dorsally between the eyes. Excepting the antennal, temporal and occipital bands, the mandibles, the œsophageal sclerite and the occipital signature, and the smoky temples, the head color is transparent. Antennæ normal, segments 1, 3, 4 and 5 smoky banded.

Thorax one-third again as wide as long. Prothorax rectangular with front and hind margins almost straight. A strong hair at each posterior lateral angle. Wide, dark, submarginal bands extending nearly to occipital signature, within which are underlying smoky areas, separated by a median clear area. Metathorax quite strongly diverging to the twice weakly emarginated posterior border. A strong and a weak spine at each angle, and a transverse series of twelve long hairs along the hind margin. Inward curving, black, submarginal bands, further bordered by



McGREGOR—Mallophaga of the Genus *Lipeurus*.

dark-brown which involves the entire segment excepting a central, clear, urn-shaped area. Legs conventional, pitchy bordered.

Abdomen clavate, widest on the fifth segment. Segments 1 to 7 each with black, lateral plates which reach well into the segment ahead, and with wide, brown, blotches within the plates with deeply indented inner margins. Segments 4 and 5 each with a faint central blotch, and a T-shaped blotch involving segments 6 to 9 inclusive. The posterior lateral angles of segments 3 to 7 supplied with hairs as follows: Segment 3, a weak prickle; segment 4, a prickle and a long hair; segment 5, two long hairs; segment 6, two long hairs; segment 7, a short and a long hair. Segment 8 with a long hair at middle of lateral margin; segment 9 with a terminal fringe of 14 long hairs; segments 2, 3, 4, 5, 6 and 8 with a long hair arising just within the head of the lateral plate; segments 1 to 7 inclusive with dorsal transverse spines as follows: Segment 1, four; segment 2, two; segment 3, two; segment 4, four; segment 5, five; segment 6, three; segment 7, four.

Type: Catalogue No. 21368, U. S. Nat. Mus.

Lipeurus texanus n. sp.

One female (Bishopp No. 3244) from meadow lark, Gainesville, Texas, November 26, 1915, coll. F. C. Bishopp, and one immature individual (Bishopp No. 4015) from turtle dove, Uvalde, Texas, November 20, 1914, coll. Parman & Bishopp.

This species is nearest *L. baculus* N., from which it is very distinct as follows: Occipital margin of head, general shape and

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Drawings by the author. Made through use of camera lucida with little attempt to restore symmetry.

EXPLANATION OF PLATE.

Plate V.

Fig. 1. Female of *Lipeurus mississippiensis* sp. nov.
2. Male of *Lipeurus brevicephalus* sp. nov.
3. Left leg III of male of *Lipeurus brevicephalus* sp. nov. (viewed ventrally).
4. Female of *Lipeurus crotophagæ* sp. nov.
5. Right leg III of female of *Lipeurus mississippiensis* sp. nov. (viewed ventrally).

posterior margin of metathorax, outline of abdomen, and peculiar abdominal lateral plates.

Description of Female. Total length, 1.55 mm.; length of head, .466 mm.; length of prothorax, .095 mm.; length of metathorax, .206 mm.; length of abdomen, .784 mm.; width of head across temples, .286 mm.; width of prothorax, .191 mm.; width of metathorax, .244 mm.; width of abdomen, .339 mm.

Head flat-iron shaped, five-eighths again as long as wide, forehead rather quickly narrowed to the narrowly truncate front which bears at each side a clavate appendage and a hair of equal length. Temporal borders sub-parallel; occipital margin nearly straight. Antennal sinuses rather shallow. Trabeculæ quite prominent. Ocular projections missing. Antennal bands extend from the clavate appendages to the ocular flecks, interrupted by the conspicuous clypeal sutures and again by the inward-pointing hyaline bars arising at the trabeculæ. Temples narrowly margined with brownish. Occiput with a thickened, clear border. Clypeus clearly demarked by the forward-angulated suture, and split by a median suture. Temples pale amber. A large, pale, irregular shaped occipital signature. General color very pale. A hair at the clypeal suture, two before the trabeculæ, one at hind angle of antennal sinuses, one on hind third of temples. Antennæ reaching behind occipital border faintly margined and banded.

Thorax about one-quarter as long as broad. Prothorax lenticular with weakly convex anterior and posterior borders, bisected faintly by a median clear bar which also bisects the metathorax. Bordered laterally by a pale margin. A weak spine at the posterior lateral angles. Metathorax pentagonal, the posterior margin strongly angulated on the first abdominal segment. Three long, pustulated hairs at the lateral angles. Like the prothorax, the general color is pale amber with colorless lateral borders. Legs rather small, pale.

Abdomen clavate, widest on the fourth segment. Posterior lateral angles of segments 2 to 8 with hairs as follows: Segment 2, a prickle; segment 3, a short spine; segment 4, a strong spine; segment 5, a long hair; segment 6, two long hairs; segment 7, two long hairs; segment 8, a short hair. Segment 9 has four short hairs and two prickles. Segments 1 to 8 inclusive are provided laterally with large rectangular sclerites, and segments 1 to 7 have in addition a narrow, brownish, lateral plate.

Type: Catalogue No. 21366. U. S. Nat. Mus.

Lipeurus bishoppi sp. nov.

Four males and one female (Bishopp No. 4995) from domestic geese, Hamburg, Miss., December 3, 1915, coll. W. E. Dove.

This species is probably nearest *L. temporalis* N., of the merganser, and it also bears some resemblance to *L. squalidus* N., of ducks, and to *L. constrictus* Kell., of scoters.

Description of Male. Total length, 3.05 mm.; length of head, .664 mm.; length of prothorax, .186 mm.; length of metathorax, .431 mm.; length of abdomen, 1.771 mm.; width of head between eyes, .442 mm.; width of prothorax, .326 mm.; width of metathorax, .431 mm.; width of abdomen, .524 mm.

Head just half again as long as wide, forehead converging to the sharply rounding front, antennal sinuses shallow, trabeculæ rather prominent, ocular flecks lacking, temples converging from the eyes to the concave occiput. Six heavy spines along the lateral half of the front and anterior half of forehead, the third of which is heaviest; a short hair before trabecular, a hair on the eye, four prickles along the temples and a long hair on the hind third of same. Antennal bands occur as thin, hyaline borders which before the trabeculæ give off a short, swollen, posterior-directed bar, and at the hind border of the antennal sinuses sends off a similar, inward-pointing bar, general color pale, smoky amber. Antennæ strong, reaching to the middle of the prothorax, segment 3 with a strongly developed hooked process.

Thorax three-sevenths again as long as wide. Prothorax rectangular, front margin quite strongly convex, hind margin weakly convex. Narrow, brownish, submarginal bands curve backward and inward, nearly meeting on the median line; coxal markings showing faintly through; general color pale amber. A prickle and a short hair at the posterior lateral angles. Metathorax quadrilateral, slightly constricted near the middle, posterior margin weakly concave. General color same as prothorax, with a brown-bordered, black spot at each lateral constriction. Six long stiff hairs on each lateral third of the hind margin. Legs strong, brownish-yellow.

Abdomen linear-clavate, widest on the fourth and fifth segments, segment 1 short and lenticular. Posterior lateral angle supplied with hairs as follows: Segment 2, one prickly; segment 3, two weak hairs; segment 4, a short and a long hair; segment 5, one short and two long hairs; segment 6, two long hairs; segment 7, two longish hairs; segment 8, two long hairs. The terminal segment is shallowly notched on each side of which is a prickle and a short hair; a smoky blotch involves most of the segment. At the anterior angles of each of segments 2, 3, 4 and 5 is a black, triangular blotch; general color transparent.

Type: Catalogue No. 21365. U. S. Nat. Mus.

Lipeurus aberrans sp. nov.

Three females and four males (Bishopp No. 7228) from the Texas bob-white (*Colinus virginianus texanus*), Columbus, O., January 25, 1917, coll. F. C. Bishopp. These birds had been introduced for experimental purposes from a point in Mexico opposite Eagle Pass, Texas.

This aberrent species is nearest *L. docophoroides* Piag., of the California partridge (*Callipepla californica*) from which it differs radically in the shape of head, prothorax and metathorax.

Description of Male. Total length, 2.18 mm.; length of head, .619 mm.; length of prothorax, .210 mm.; length of metathorax, .240 mm.; length of abdomen, 1.112 mm.; width of head, .532 mm.; width of prothorax, .370 mm.; width of metathorax, .608 mm.; width of abdomen, .741 mm.

Head a trifle longer than wide, the fore margin forming a nearly even curve between the trabeculæ which are very strongly developed. Antennal sinuses deep. Ocular projections very conspicu-

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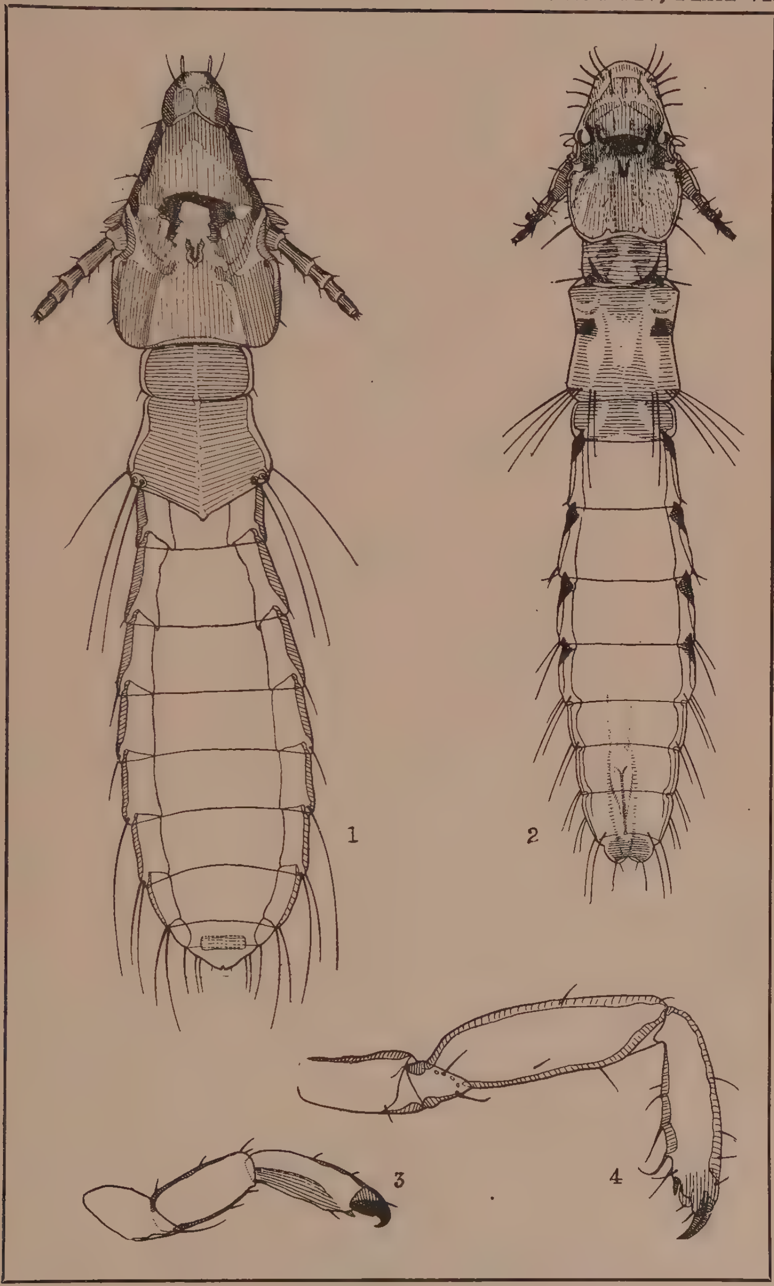
Explanation of Plate.

Plate VI.

Fig. 1. Female of *Lipeurus texanus* sp. nov.
2. Male of *Lipeurus bishoppi* sp. nov.
3. Right leg III of female of *Lipeurus texanus* sp. nov. (viewed ventrally).
4. Left leg III of male of *Lipeurus bishoppi* sp. nov. (viewed ventrally).



McGregor—Mallophaga of the Genus *Lipeurus*.

ous. Temples at first parallel and then rounding convergingly to meet, without angles, the nearly straight occiput. Antennal bands black, conspicuous, paling just before ocular blotches which extend inward and forward as a narrowing bar; ocular bands replaced by pale underlying sickle shaped bars; temples margined by a black, crenate band which extends paler along the occipital margin; excepting the smoky colored, spindle shaped occipital signature, the brown œsophageal sclerite and mandibles, the general color is pale. Six prickles and two short hairs along the frontal border, a prickle and two short hairs before the trabeculæ, a long hair from over the eye, two long hairs and four prickles from the temples. Antennæ very stout, basal segment about equalling all others, third segment brownish and with strong, hooked appendage, second segment with weak but well defined appendage.

Thorax one-third again as wide as long. Prothorax somewhat trapezoidal, the posterior margin rather strongly convex. Lateral margins bordered with heavy, black bands from the anterior ends of which narrow, fainter underlying bars extend backward and inward; a pale blotch occurs at each posterior lateral angle, and a small, triangular blotch lies directly behind the occiput. A long hair arises at each posterior angle. Metathorax pentagonal the hind margin sharply angulated on first abdominal segment; lateral sides diverging very abruptly. A dark interrupted, submarginal band extends from the prothorax to the black, pustulated blotch at the posterior lateral angle, and a triangular blotch involves each temple; excepting these markings and an anterior median pair of faint blotches, the general color is pale. A spine and a short hair at the lateral angles, and five long, pustulated hairs on each lateral third of posterior margin. Legs normal, brown bordered and banded.

Abdomen clavate-ovate, widest on fourth segment, contracted abrupt at the seventh segment. Segments 1 to 7 inclusive with narrow, brownish, lateral plates over-reaching hind end of plate next ahead. Segments 1 to 7 each with a chestnut-brown transverse blotch which are parted on the median line; those of segments 1 to 6 with a large hyaline spot at the sides, and in addition those of segments 2 to 7 with a small, clear, circular spot at their centers. Segments 3 to 8 with hairs at the posterior lateral angles as follows: Segment 3, a short hair; segment 4, two long hairs;

segment 5, three long hairs; segment 6, three long hairs; segment 7, a short and a long hair; segment 8, three long hairs. Segments 1 to 7 with series of transverse short hairs as follows: Segment 1, 24; segment 2, 21; segment 3, 29; segment 4, 29; segment 5, 26; segment 6, 18; segment 7, 12. Along each side of terminal segment a fringe of ten successively shorter hairs. An irregular-shaped genital blotch involves segments 8 and 9.

Type: Catalogue No. 21364. U. S. Nat. Museum.

Lipeurus lineatus sp. nov.

One male (Bishopp No. 4063[a]) from quail, Hamburg, Miss., January 5, 1915, coll. W. E. Dove. The specimen is somewhat shrunken so that excepting, probably, the head, a proper restoration would show the body parts rather ampler than indicated in the camera lucida drawing accompanying.

This species is nearest *L. variabilis* N. of the domestic fowl, but differs from it in the head markings, shape of metathorax, shape and markings of abdomen, and in the nature and distribution of hairs.

Description of Male. Total length, 2.05 mm.; length of head, .480 mm.; length of prothorax, .133 mm.; length of metathorax, .231 mm.; length of abdomen, 1.193 mm.; width of head, .302 mm.; width of prothorax, .196 mm.; width of metathorax, .290 mm.; width of abdomen, .267 mm.

Head subrectangular, three-fifths again as long as wide. Widest just before antennæ. Forehead bullet-shaped, with a dusky border darkest midway along the margin; antennal sinuses deep; trabeculæ fair sized; temple margins gradually diverging and meeting the rather deeply emarginate occiput without angles. Eyes not protruding beyond margin; ocular flecks conspicuous; antennal bands most distinct just before antennæ, interrupted across antennal bases and reappearing to form ocular blotches; temples bordered with pale brown bands; very faint occipital bands. With exception of foregoing markings and the chestnut brown mandibles, the general color is transparent. Two longish hairs on front, two longish and one long hair at beginning of forehead, three short hairs before antennæ, two shortish hairs on temple, two prickles dorsally before occipital emargination, and two strong spines dorsally near center of forehead. Antennæ very strong, reaching behind hind margin of prothorax; basal segment with strong spur posteriorly, third segment with a spur-like projection.

Thorax one-quarter again as long as wide. Prothorax rectangular, posterior margin nearly straight, bordered laterally by chestnut brown bands from which faint, narrow, underlying bands extend inward to near the median line. A weak hair on each side of posterior margin midway to center. Metathorax roughly quadrate, posterior margin slightly rounded. Submarginal, brownish bands ending posteriorly at the smoky-ringed pustulations on the posterior lateral angles which give rise to five longish to long hairs. Anterior and posterior angles each with smoky blotches, and median sternal blotches showing through; general color pale. A weak hair on the hind margin just within the pustulations. Legs very long, smoky bordered.

Abdomen (in the contracted specimen) linear, noticeably constricted on the third and fourth segments, widest on the first segment. Segments 1 to 8 inclusive with wide, chestnut brown lateral bands. Segments 2 to 8 with hairs at the posterior lateral angles as follows: Segment 2, a long hair; segment 3, a long hair; segment 4, a prickle; segment 5, a short spine; segment 6, a short spine; segment 7, a longish hair; segment 8, two extremely long, slender hairs. Segment 8 gives rise at the middle of lateral plate to a prickle and a very long hair, and at the posterior margin two pustulations give rise each to two short hairs. Segment 9 bears a pair of terminal prickles. Segments each 1 to 8 inclusive bear centrally a pair of dorsal spines. Faint lateral blotches, which become slightly darker posteriorly, almost totally involve each of the segments. A faint genital blotch involves segments 7, 8 and 9.

Type: Catalogue No. 21362. U. S. Nat. Mus.

Lipeurus clavatus sp. nov.

One female (Bishop No. 4063^{b}) from quail, Hamburg, Miss., January 5, 1915, coll. W. E. Dove.

This species is closest to *L. snodgrassi* Kell., of the hummingbird, and *L. introductus* Kell., of the pheasant, but not at all resembling the known Lipeuri of the partridge or the Bob-white.

Description of Female. Total length, 2.03 mm.; length of head,

.477 mm.; length of prothorax, .126 mm.; length of metathorax, .243 mm.; length of abdomen, 1.170 mm.; width of head across temples, .288 mm.; width of prothorax, .225 mm., width of metathorax, .360 mm.; width of abdomen, .477 mm.

Head two-thirds again as long as wide, projectile-shaped. Antennal sinuses extremely shallow. Ocular projections slightly noticeable. Forehead and front margined with a pale, narrow band which turns inward before the antennæ to form a pair of pitchy spots; commencing at the eyes the temples are margined with a chestnut colored band which gradually pales posteriorly; a pair of pitchy spots occur at the occipital border; with these exceptions, and the smoky temples, the general color is pale. Six prickles on forehead between center of front and trabeculæ; four prickles and a long hair on the temples. Antennæ normal.

Thorax about as wide as long. Prothorax roughly trapezoidal, pale straw-color, with narrow, brown, submarginal bands; posterior margin nearly straight; a weak spine before posterior lateral angles. Metathorax trapezoidal, posterior border straight, general color same as prothorax, sides mostly pale-bordered with submarginal brownish bands; four very long hairs at each posterior lateral angle. Legs unusually small, pale.

Abdomen clavate-elliptic, widest on the fourth segment. Segments 2 to 7 each with blackish-brown lateral bands which widen slightly at their anterior and posterior ends into brownish, inward-pointing blotches; segments 2 to 7 inclusive with extremely faint transverse blotches, those of segments 3 to 7 each bisected medially; segment 8 with a slightly darker transverse blotch. Hairs at the

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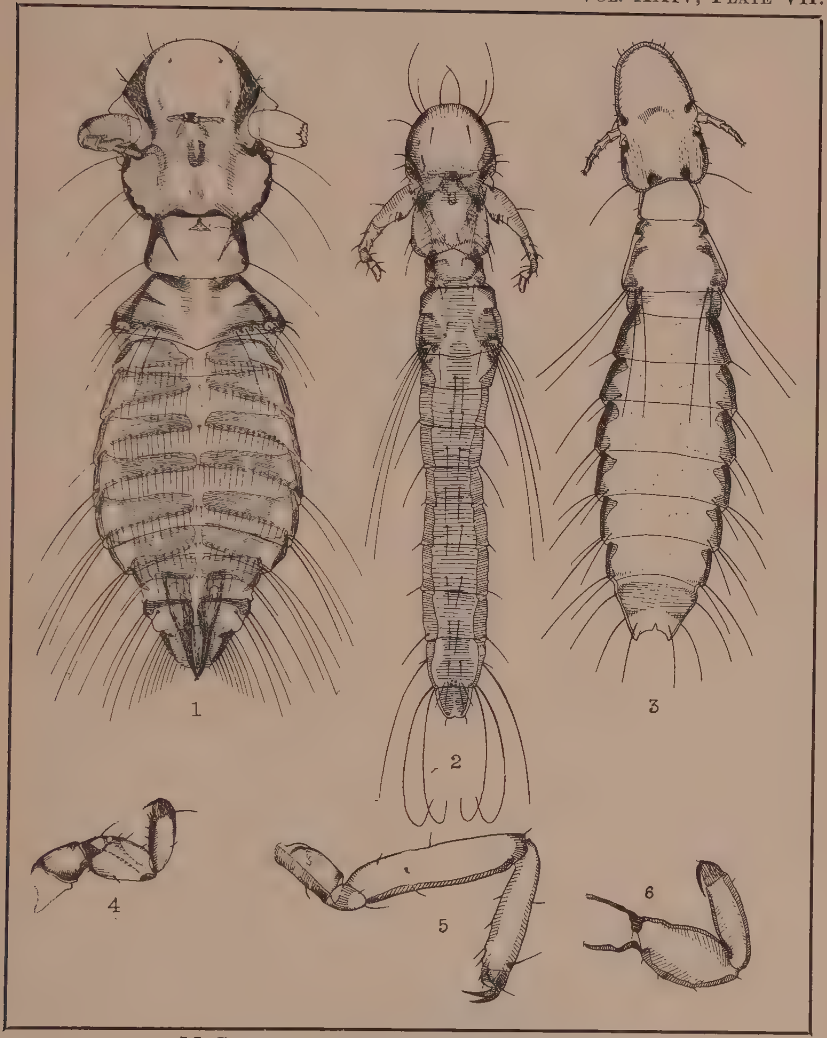
EXPLANATION OF PLATE.

Plate VII.

Fig. 1. Male of *Lipeurus aberrans* sp. nov.
2. Male of *Lipeurus lineatus* sp. nov.
3. Female of *Lipeurus clavatus* sp. nov.
4. Left leg II of male of *Lipeurus aberrans* sp. nov. (viewed ventrally).
5. Right leg III of male of *Lipeurus lineatus* sp. nov. (viewed ventrally).
6. Right leg III of female of *Lipeurus clavatus* sp. nov. (viewed ventrally).



McGregor—Mallophaga of the Genus *Lipeurus*.

posterior lateral angles as follows: Segment 2, a short hair; segment 3, a long hair; segment 4, a long hair; segment 5, two long hairs; segment 6, two long hairs; segment 7, a long hair; segments 3 to 7 each with a long hair arising just mediad of the lateral angles; segment 8 with two long hairs laterally; a pair of long, subterminal hairs before the deeply emarginate posterior tip.

Type: Catalogue No. 21367. U. S. Nat. Mus.

NOTES ON SOME NEW SPECIES OF THE GENUS DIOCTRIA (ASILIDÆ).

By Nathan Banks,
Museum of Comparative Zoology, Cambridge, Mass.

Our Eastern specimens of the genus Dioctria have all been placed in the species *albius* Walker. In examining our specimens I note, however, two types of male genitalia. In one, the northern form, the superior plate has two broad lobes, sometimes standing out flat, sometimes rolled down over the other parts; in the other more southern specimens the superior plate is divided into two long tapering parts ending in a knob-like enlargement, with a tooth on the inner surface and a pencil of yellow hair on the outer edge. The northern form is the true *albius* Walker; it has the third antennal joint short, and with a very short style; the mystax is black; the body is rather longer than in the southern forms. The southern forms I divide into two species, one with the antennæ like *D. albius;* the other with the third joint and style much longer; both are new.

Dioctria brevis sp. nov.

Black, bronzy as in *D. albius*, and in general similar to that species; the third antennal joint barely if any longer than in *D. albius.* It differs at once, in the shape of the superior plate of the male genitalia, having two long tapering divisions, rather swollen at their tips, with a sharp, slender tooth on the inner side shortly before tip, and on the outer side a pencil of yellow hair.

Specimens are 8 to 10 mm. long, and come from Sea Cliff, N. Y.; Medina, Ohio; Englewood, N. J.; and north fork Swannanoa River, Black Mountains, N. C.

Type: M. C. Z. 10032.

Dioctria longicornis sp. nov.

This in appearance is similar to *D. brevis;* in some the mystax is mostly white, and the pleural piece in front of wing-base is not often pollinose. The male genitalia are closely similar to those of *D. brevis*, but the branches of the lateral appendages are not just the same. It differs, however, at once from *D. brevis* and also *D. albius* in the very much longer antennæ; the third joint being much longer than the first and second together, and the style longer and about as thick as the third joint.

Specimens are 7 (♂) to 9 (♀) mm. long, and all I have are from the vicinity of Washington; Chain Bridge, Glencarlyn, and Dead Run, Virginia.

Type: M. C. Z. 10033.

Dioctria longicornis var. **tibialis** var. nov.

Two males differ from the type in having all the tibiæ reddish on basal half. They are from Chain Bridge, Va.

Type: M. C. Z. 10034.

Dioctria media sp. nov.

Black, face golden, mystax black, thorax and abdomen more hairy than in *D. albius*, thorax reddish pollinose much as in *D. albius;* the third antennal joint and the style about as in *D. albius;* the body shorter than in *D. albius;* the male genitalia have the superior plate a slender, finger-like projection, about four times as long as broad, with parallel sides and undivided; the lateral arms of the genitalia are very much shorter and heavier than in either *D. albius* or *D. brevis*. Length 7 to 8 mm.

Five specimens from Sonoma County, Calif., 4 July (Osten Sacken), San Raphael, Calif. (Osten Sacken) and California (H. Edwards). These were doubtfully referred to *D. albius* by Osten Sacken, but the male genitalia show them to be very distinct.

Type: M. C. Z. 10037.

Dioctria pleuralis sp. nov.

Black, face golden to white, mystax pale; third joint of the antennæ very long, the style about one-fourth of the third joint; vertex shining, the thorax with mostly yellowish hairs. On the pleura from base of wings to front coxæ is a yellowish pollinose stripe. Legs all pale yellowish, the hind basitarsus very large, as long as the next three joints together; the mesothorax has the hind lateral pieces yellowish, and the metathorax is golden pollinose; abdomen dull rufous, with indistinct black on each segment, mostly near the middle, first segment wholly black. Wings moderately fumose. Length, 8 mm.

One female from Los Angeles, Calif. (Clark coll.).

Differs from *D. rubidus* in the pale coxæ, and shape of style, from *D. pusio* in color of the abdomen and thorax, and the shape of the style.

Type: M. C. Z. 10035.

Dioctria flavipes sp. nov.

Runs to no. 6 in Back's table. The legs wholly pale yellow (including coxæ); the mystax pale; the abdomen black, largely reddish below; the second segment has a reddish spot on the sides in front, hardly seen from above, the third segment has a basal reddish band, the fourth segment with both basal and apical bands of reddish, the fifth and sixth segments with reddish at tip. The hind basitarsus is large, and as long as the next three joints together; the body has few, short hairs. Length 6 mm.

One ♀ from Yakima, Washington, 2 July 1882 (Samuel Henshaw coll.).

Type: M. C. Z. 10036.

Dioctria sackeni Will.

The specimen from the White Mountains referred to by Williston in the Osten Sacken coll. is a male and has the genitalia similar to those of *albius*, but the parts are close together and may differ in details not clearly visible in this specimen.

NEW SOCIAL BEES.

By T. D. A. Cockerell,
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A close study of the Neotropical social bees of the genera *Melipona* and *Trigona* brings out the fact that there are numerous local races or subspecies, such as may be found among the ants. Most of the new forms coming to light are so closely related to others previously described, that it becomes a matter of convenience or opinion whether to regard them as distinct but closely related species, or races of aggregate species. Two or more of these closely related forms may occupy the same general region, and on the other hand, any one of them may extend over an enormous territory. They do not seem to be closely related to any special environmental factors, but they do follow the lines of general variation in the group, showing greater or less intensity of color or extension of color-pattern. They are practically constant in any one lot, and we do not find much miscellaneous individual variation. All this so closely parallels the condition among the ants, that we naturally look for a common cause or factor, which can only be the social mode of life, with continual inbreeding. In both groups, it is probably rare for individuals to mate with others than members of their own colony. Following up this idea, we note a similarity between the relationship of the different forms and that to be observed between these occupying a series of small islands; *e. g.*, the birds of the Lesser Antilles, or the rats of the small islands of the Malay Archipelago. Continual inbreeding within a limited group or area will lead to homozygosity, and small differences in the original constituents may appreciably affect the end result. An occasional cross between stable races thus established will break up the combinations and furnish material for a series of new types.

It must be said, however, that in *Bombus* we do not observe the same state of affairs. The species of *Bombus* are notoriously variable in color, and the varieties are largely local, but they are also largely individual. In *Bombus*, if I rightly understand the facts, the odoriferous males assemble from various nests, and do not necessarily or perhaps more than frequently mate with members of their own colony. If this is true, we can see why there is more miscellaneous variation in *Bombus*, and less tendency to produce a series of slightly different yet constant races.

Although we cannot discern any obvious connection, at least of an adaptive nature, between the color-variations of all these genera and the environment, it does not follow that no relation of any sort exists. In *Bombus*, at least, there are some very remarkable cases of parallel variation in particular regions. This subject has been dealt with at length by Friese and Wagner, and O. Vogt, and Sladen gives a summary of some of the more important facts in his work "The Humble-Bee," p. 148. A most striking case is described below; the beautiful black, white and red colors of *Bombus terrestris simlaënsis* are duplicated by those of *B. niveatus callophenax* from the same region, though structurally the bees are quite distinct. It is beyond belief that all these cases of parallel color variation are accidental, depending on no common cause. There may be Müllerian mimicry involved, but the whole subject appears to need further investigation. It is not impossible that in some cases the coloration really indicates relationship, and that the structural characters have varied. We always tend to assume that structure is far more permanent than color or marking, but fossil insects show the enormous antiquity of color-patterns. In the quite numerous cases in which bees resemble in color and pattern species of quite other genera, or even wasps, it is manifest that the colorational similarity is secondary, and not due to common descent from insects so colored.

Bombus terrestris simlaensis Friese

Female: Kashmir, 9,000 ft., June 1911 (*R. L. Woglum*). This has the relatively short malar space of *B. terrestris*, as also has a worker of *B. terrestris fulvocinctus* Friese, from Simla, which was labelled *B. tunicatus* Smith in F. Smith's collection. Meade-Waldo has recently referred *B. tunicatus* Smith as a variety to *B. lapidarius;* but the specimen before me, from Smith's collection, has rather the structure of *terrestris*. The type locality of *tunicatus* is Chusan, China. According to Meade-Waldo, *B. gilgitensis* Cockerell is also a variety of *B. lapidarius*, but the form of the malar space seems to ally it rather with *B. terrestris*. *Bombus incertus* Morawitz, which I have from A. Skorikov, is said by Meade-Waldo to be the same as *tunicatus;* it has the structure of *lapidarius*, not that of *terrestris*. The indications are that Smith mixed two species under *tunicatus*, which explains the discrepancy referred to above.

Bombus niveatus callophenax subsp. nov.

Female: Length about 19 mm.; exactly like *B. terrestris simlaënsis* in color and appearance, except that it is considerably less robust, but easily separated by the third antennal joint, which is about three times as long as fourth, longer than fourth and fifth, but not quite equal to 4-6; also by the much longer malar space, which is fully 1.5 times its apical width. From typical *B. niveatus* (which I have from A. Skorikov) it is known by the white and black hair on the second abdominal segment being arranged as in *simlaënsis*, the lower edge of the white strongly curved, not reaching hind margin of segment. The surface of the clypeus is more polished and less punctured than in *niveatus*. It differs from *B. gilgitensis* at once in the malar space, the distinctly though delicately punctate apical segment of abdomen, the white hair of scutellum not mixed with black, and venter of abdomen without fulvoferruginous hair. The apical abdominal segment has scanty black hair (it is red in *niveatus*), and the wings are dark reddish, much darker than in *niveatus*. From *B. incertus* it is easily known by the antennæ. Kashmir (*R. L. Woglum*). U. S. Nat. Museum. Perhaps a distinct species, to be called *Bombus callophenax*.

Trigona mirandula sp. nov.

Worker: Length about 5 mm., rather robust, shining; head large, broader than thorax, but facial quadrangle considerably longer than broad; mandibles without teeth, basal half yellow, apical red; labrum yellowish; cheeks pale yellow suffused with red; malar space obsolete; clypeus ferruginous, the lower margin pale yellow; supraclypeal area and lower half of middle of front pale reddish, but sides of face almost to summit of eyes with extremely broad pale yellow bands; upper half of front black, with a median yellow line; vertex black; scape light ferruginous, darkened at apex; flagellum dark above, reddish beneath; mesothorax black, with narrow lateral margins, which extend to axillæ; rest of thorax clear red; legs red, hind tibiæ longitudinally divided red and black, the black extending right across apically; hind basitarsi largely dark; hind tibiæ broad, but not extremely so, the fringing hairs pale red;

hind basitarsi ordinary; tegulæ pale reddish; wings grey, stigma and nervures dusky reddish, not dark; abdomen red, each segment with a rather broad black band, the whole coloration rather dark and obscure, but shining.

Pozo Azul, Costa Rica, June 15, 1902 (*M. A. Carriker*). U.S. Nat. Museum. A remarkably ornamented species, related to *T. zonata* Smith, but differing in color of legs and several other details.

Trigona beccarii jombenensis subsp. nov.

Worker: Like *T. beccarii* Gribodo, except that there is more light color on scape, and the clypeus is yellow, with a narrow black band along anterior margin, and a pair of oblique reddish marks above.

Jombene Range, East Africa (*Chanler-Hohnel Expedition*). U.S. Nat. Museum.

Trigona curriei sp. nov.

Worker: Length about 3 mm., robust, black; head large and quadrate; mandibles and base of scape red; clypeus with a median groove; whole body polished and shining; cheeks very broad; tegulæ fuscous; wings dilute brownish, stigma pale with a dusky margin; legs obscurely reddish; abdomen short and broad, the first segment very obscurely more or less reddish. Related to *T. magrettii* Friese, but easily separated by the brownish wings. The head also is quite broad.

Mt. Coffee, Liberia, Africa, April, 1897 (*R. P. Currie*). U. S. Nat. Museum.

Trigona musarum sp. nov.

Worker: Length about 6 mm., robust, clear reddish-fulvous, with little hair; head large, but facial quadrangle longer than broad; clypeus and sides of face suffusedly yellowish; mandibles dusky at apex, of the simple type, with a small tooth at inner corner; malar space well developed; face and front shining; vertex with fuscous hair; scape long and slender, yellow, with a dark mark posteriorly above; flagellum piceous above, ferruginous beneath; thorax above polished and shining, with thin brown hair; mesothorax rather obscurely spotted with fuscous, the lateral margins and axillæ obscurely yellow; tegulæ large, light fulvous; wings dilute grey, stigma slender; legs entirely fulvous, anterior and middle ones with concolorous hair; hind tibiæ extremely broad, hind margin with dark hairs; hind basitarsi broad, the outer apical angle produced as a broadly rounded lobe; abdomen broad, shining, the apical part suffusedly dusky.

Type: From "Philadelphia Banana R.," Costa Rica (*F. Knab*). U. S. Nat. Museum. Also from Boqueron River, Panama, May, 1907 (*Aug. Busck*). The name given is from *Musa*, the banana. Differs from *T. mellea* Smith and *T. pallida* Latr. by the broad hind tibia and quite differently shaped basitarsus. From *T. mellicolor* Packard (which M. A. Carriker has taken at Pozo Azul, Costa Rica), it differs at once by the shape of the head. *T. mellicolor* is a member of "*coccofago*" group, and has an extremely broad head; while the metathorax is black, with a transverse testaceous patch.

Trigona salvatoris sp. nov. (*tataira* subsp.?)

Worker: Length 5–5½ mm.; closely allied to *T. mediorufa* (Cockerell), with the same black and red pattern of mesothorax, but differing thus: head black (faintly reddish), the clypeus dull yellow with two dark marks, a pale spot behind lower end of eye (in immature specimens the whole head dusky reddish); scape dark reddish; posterior half of abdomen suffusedly dusky.

Type: From S. Salvador, Salvador, August 15 (*F. Knab*). U.S. Nat. Museum. Also from Escuintla, Guatemala (*F. Knab*). Perhaps only a race of *T. mediorufa.*

These bees of the "*coccofago*" group, with their very broad heads and remarkable habits, may be regarded as a distinct subgenus (*Oxytrigona* subg. n.), with *mediorufa* as the type. *T. mediorufa* was described as a subspecies of *T. flaveola* Friese, but the latter name cannot stand, as there is an earlier *T. flaveola* Spinola. It is assumed that *T. coccofago* or *cagafogo* (the name is variously spelled) is identical with *T. tataira* Smith; in fact "tataira" is the popular name of the bee. When making comparisons in Psyche, 1913, p. 13, I neglected to note that my cotype *tataira* was a male, and that the name was founded by Smith on males alone. It seems probable that we shall have to recognize a species *T. tataira*, with various races, as follows:

Trigona tataira Smith.

Trigona tataira friesiella n. n. (*flaveola* Friese).

Trigona tataira mediorufa (Ckll.).

Trigona tataira salvatoris (Ckll.).

T. mellicolor Pack. should apparently be kept distinct. The question whether to regard all these bees as species, or group them as races of an aggregate species, must be decided largely on grounds of convenience. The case is parallel to those frequently observed among ants.

Trigona perangulata sp. nov. (*clavipes* subsp.?)

Worker: Length about 7 mm., slender; very close to *T. clavipes* Fabr., differing thus: lateral face-marks coming up to level of top of clypeus; legs clear red, with trochanters yellow on outer side, anterior and middle femora yellowish above apically, middle basitarsi with most of posterior half black, hind tibiæ broadly black posteriorly on apical half (this black area anteriorly with a large round lobe), hind basitarsi largely blackened; abdomen with four black bands, the first divided in middle by a cuneate paler area, the others angularly pointed in middle cephalad, and correspondingly notched caudad.

Type: From Alhajuelo, Panama (Canal Zone), May 27, 1912 (*A. Busck*). U. S. Nat. Museum. Also from Pozo Azul, Costa Rica, June 15, 1902 (*M. A. Carriker*).

Trigona pachysoma sp. nov. (*postica* subsp.?)

Worker: Length about 6 mm., very broad and robust, with short abdomen. Very close to *T. postica* Lat. (Prov. Sara, Dep. Sta. Cruz de la Sierra, Bolivia, 500 m., *J. Steinbach*), but with an obscure red spot on each side of face, wings strongly suffused with orange, nervures and stigma clear ferruginous, fifth abdominal segment without evident pale hair-patches. Compared with *T. bipunctata* Lep. (from F. Smith's collection) it is more robust, with more highly colored wings; the facial spots in *bipunctata* are dull white.

Type: From Porto Bello, Panama, April 20, 1912 (*A. Busck*). Also from Culebra, Canal Zone, 1910 (*H. H. Rousseau*). These insects have strong grooves on the mesothorax, which are lacking in the superficially similar *T. branneri* Ckll. In *T. branneri* the abdomen is dorsally polished and shining all over; in *T. pachysoma* dull, the bases of the segments shining. My *T. postica* is from the

Berlin Museum, and was determined by Strand. Specimens from S. Paulo, determined as *postica* by Friese, are another species, having the tubercles tipped with yellow, and the abdomen beyond second segment covered with fulvous hair.

Trigona nitidula sp. nov. (*frontalis* subsp.?)

Male: Length about 4 mm.; closely resembling *T. frontalis* Friese, but the wings are quite clear (not greyish), and the nervures and stigma are dull testaceous; the abdomen is entirely dark. Eyes red; orbits converging below; clypeus, labrum, supraclypeal area and lateral face-marks yellow; mandibles yellow; scape yellow in front. Thorax shining black, with narrow lateral margins of mesothorax, axillæ and hind margin of scutellum cream-color.

Tucuman, Argentine, December 26, 1912 (*A. H. Rosenfeld and T. C. Barber*). U. S. Nat. Museum. The types of *T. frontalis* came from Honduras, whence are also specimens in the U. S. National Museum, received from Friese. A related but larger species is *T. remota* Holmbg., which I have from S. Paulo, Brazil. Also of this group is *T. molesta* Puls, of which I have seen specimens from S. Paulo and Blumenau, determined by Friese.

Trigona opaca sp. nov. (*lineata* subsp.?)

Male: Length about 5 mm.; black, the front, long mesothorax and large scutellum dull; band on prothorax (interrupted in middle), lateral margins of mesothorax, continuing on axillæ and round margin of scutellum, as well as a large mark on tubercles, from which a line proceeds anteriorly, all clear yellow; clypeus (except two light brownish bars on disc), mandibles, supraclypeal mark (separated by a line from clypeus) and narrow bands along inner orbits to not far from top, all pale yellow; labrum dark brown, with a pale dot at each side; malar space small; eyes red; scape yellow in front; flagellum black, obscure red beneath; anterior and middle tibiæ light yellow on outer side, hind tibiæ with a broad light yellow band behind; tarsi rufofuscous; tegulæ rufofuscous, with a minute pale dot; wings greyish, with a pale yellow spot at base, just behind tegulæ, stigma and stronger nervures piceous; abdomen dullish, without markings, whole insect almost hairless, looking like a *Prosopis*.

Tabernilla, Canal Zone, Panamá, July, 1907 (*A. Busck*). Very near to *T. lineata* Lep., but with yellow markings, and apparently distinct. Unfortunately, I do not know the male of *lineata;* and even R. du Buysson, who had a nest full of *lineata*, found no males. There is a good deal of confusion as to what *T. lineata* really is. The species I accept as such (from Brazil) is that called *lineata* by Friese. Baker and Ashmead formerly identified as *lineata* Mexican specimens of *T. frontalis flavocincta* Ckll., an insect easily separated by the shining mesothorax. Ducke stated in 1910 that *T. bilineata* Say was the same as *lineata;* but what I have regarded as *bilineata* (e. g. from Mexico, D. F., *J. R. Inda*) is extremely close to *T. bipunctata* Lep., agreeing in the light patches at sides of face. The clypeus of *bilineata*, as thus interpreted, is highly polished; that of *bipunctata* dullish.

Trigona atomaria sp. nov.

Worker: Length about 3 mm.; yellow, including antennæ; face and front without markings, but vertex with a transverse dark band enclosing ocelli; metathorax dorsally pure black; legs yellow, hind tibiæ (which are not unusually broad) with hind and apical margins on outer side broadly brown, hind basitarsi, brown on outer side; tegulæ pale testaceous; wings clear hyaline, nervures and stigma pallid; stigma large, with a dusky margin; abdomen with black bands on hind margins of segments. Head ordinary, abdomen broad.

Pozo Azul, Costa Rica, June 15, 1902 (*M. A. Carriker*). A singular little species, not close to any other. It may perhaps be compared with *T. goeldiana* Friese, from Pará, but the markings are wholly different.

Trigona ferricauda sp. nov.

Worker: Length about 5.5 mm., with long and ample wings; head large but of ordinary shape, black, with clypeus, supraclypeal area and lower corners of face (the last obscurely) ferruginous; sides of face and cheeks with a dense pale (olivaceous on cheeks) pruinose pubescence; front and vertex smooth and shining; mandibles ferruginous, strongly quadridentate, with also a minute tooth between third and fourth, the teeth black; malar space short; scape light rufotestaceous, black above at apex; flagellum black above, rufotestaceous beneath, last joint bright red above and below; thorax rufofulvous, with pale hair; mesothorax shining, black with narrow red lateral and hind margins; mesopleura with a large black spot below; middle of mesothorax shining, distinctly darkened, sides densely ochreous-pruinose; tegulæ pale rufotestaceous; wings greyish; stigma slender, dull pale yellowish; legs entirely clear ferruginous, hind tibiæ relatively narrow, the fringe on hind margin long and red; hind basitarsi nearly parallel-sided; abdomen rather narrow, entirely shining ferruginous.

Porto Bello, Panama, April 18, 1912 (*A. Busck*). Related to *T. braueri* Friese, from Brazil, but readily separated by the black mesothorax. There is a strong superficial resemblance to *T. dorsalis* Smith, which occurs at Alhajuelo, Panama (*Busck*), Guapiles, Costa Rica (*Crawford*) and Secanquin, Guatemala (*G. P. Goll*).

SYNOPTIC KEYS TO THE LYGÆIDÆ (HEMIPTERA) OF THE UNITED STATES.

By H. G. Barber,
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Part I.

Several months ago I was requested by Dr. W. E. Britton of the Connecticut Agricultural Experiment Station to prepare a list of the Lygæidæ occurring in Connecticut, with suitable keys, for the proposed list of Hemiptera of the state. As a basis for this work I found it necessary to construct synoptic keys of all of the subfamilies, tribes and genera for the entire United States. As so much time and study has been spent in their preparation, and as no such keys covering this family, restricted to our fauna, has ever been published, it seems advisable to publish these in the hope that they may be of service in solving some of the difficulties experienced by systematists in this troublesome group. Professor Gregory, superintendent of the Connecticut Geological and Natural History Survey, and Dr. Britton have kindly given their consent to this publication in advance of the appearance of such parts as apply only to New England Lygæidæ.

I have used as a basis for these keys Stal's "Genera Lygæidarum

Europæ," Ofv. Vet.-Akad. Förh., 1872, and Enumeratio Hemipterorum, Part 4, 1874. As Van Duzee's excellent "Check List of the Hemiptera of the United States," recently published, will be used for reference I have adopted his system of nomenclature and order of arrangement. However, I have found it necessary to transfer the genus Orsillacis Barb. to the Tribe Lygæini. Part II will include the Subfamily Rhyparochrominæ or Aphaninæ.

I desire to express my appreciation to Dr. W. E. Britton, who makes the publication of these keys possible and to Mr. H. M. Parshley of Bussey Institution, who has suggested some important changes in my keys.

Key to the Subfamilies of Lygæidæ.

A. All sutures between the ventral segments of the abdomen straight and reaching the lateral margins on each side. Head commonly without setæ near the eyes.

B. All of the abdominal spiracles situated dorsally. Entire posterior margin of the pronotum, or at least the margin before the scutellum, turned down convexly. Fore femora, compared to the succeeding pairs, not much swollen and rarely armed beneath with teeth or spines.

C. Posterior margin of the pronotum between scutellum and lateral angles more or less distinctly depressed or impressed. Hemielytra, also usually the head, pronotum and scutellum impunctate. The two interior veins of the membrane commonly joined together near base by a transverse vein............. *Lygæinæ* Stal.

CC. Posterior margin of the pronotum between the scutellum and lateral angles not distinctly depressed or impressed. Hemielytra, head, pronotum and scutellum distinctly punctate. The two interior veins of the membrane not joined together near base by a cross vein.................................. *Cyminæ* Stal.

BB. All of the abdominal spiracles not situated dorsally, at least those of the sixth placed on the venter. Posterior margin of the pronotum, at least before the scutellum, commonly not turned down convexly. Fore femora, as compared with the succeeding pairs, more or less shortened and swollen, armed or unarmed.

D. All of the abdominal spiracles not situated ventrally, at most only the three apical ones so placed. The anterior femora moderately incrassate and commonly unarmed (except some species of Ischnodemus).

E. Head always narrower than the posterior margin of the pronotum; tylus not sulcate. Hemielytra not convex and almost if not quite impunctate; clavus not narrowing posteriorly; commissure distinct, at least half as long as scutellum. Fore femora sometimes much swollen (Ischnodemus) *Blissinæ* Stal.

EE. Head, across eyes, very broad, as wide as or wider than the posterior margin of the pronotum. Tylus usually sulcate. Hemielytra convex and plainly punctate; clavus commonly narrowing posteriorly; commissure usually absent or very short. Fore femora moderately incrassate and unarmed *Geocorinæ* Stal.

DD. All of the abdominal spiracles situated ventrally. Anterior femora more or less swollen and armed with one or more spines.

F. The anterior femora much swollen and armed beneath with one or more teeth. Exterior vein of corium not parallel with margin. Corium not wider than abdomen. Bucculæ short, confined to front of head. Posterior coxæ not widely separated.

G. Membrane with the two interior veins connected anteriorly by transverse veins. Posterior margin of pronotum very concave before scutellum. Fore femora not armed with numerous teeth *Heterogastrinæ* Stal.

GG. Membrane with the two interior veins not connected anteriorly by a transverse vein; all veins running from the base, sometimes posteriorly reticulate. Posterior margin of the pronotum straight before the scutellum. Fore femora much swollen and armed with numerous teeth *Pachygronthinæ* Stal.

FF. The anterior femora not so incrassate as in the preceding and armed with a single tooth. Corium expanded, wider than abdomen; exterior vein sub-parallel with margin of corium. Bucculæ extended through the head. Antennæ inserted close to bucculæ. Posterior coxæ widely separated......*Oxycareninæ* Stal.

AA. The suture between the third and fourth ventral segments of the abdomen most commonly curved anteriorly and not reaching the lateral margins. Head commonly provided with two setæ near eyes. Fore femora swollen and armed with teeth *Rhyparochrominæ* Stal.

Key to the Tribes and Genera of the Subfamily Lygæinæ.

A. Apical margin of the corium straight, not sinuate inwardly. Exterior apical angles of antenniferous tubercles obtuse or sub-obtuse. Last dorsal segment of the male truncate. Genital segment of the males not foveate.........Tribe *Lygæini* Stal.

B. Basal segment of antennæ just surpassing the apex of the tylus. Rostrum not extending beyond the first segment of the abdomen. Head short and broad.

C. Posterior margin of pronotum before scutellum sinuate; carinate anteriorly in the middle. Scutellum more or less tumid and carinate apically *Oncopeltus* Stal.

CC. Posterior margin of pronotum truncate; without a median keel or with keel not reaching the anterior margin. Scutellum not tumid, with a longitudinal keel, commonly joined to a transverse keel at base. *Lygæus* Fab.

BB. Basal segment of the antennæ not reaching apex of tylus. Rostrum extending to the middle of the venter. Head longer than broad.....................*Orsillacis* Barb.

AA. Apical margin of corium inwardly sinuate. Scutellum near base with a more or less distinct transverse ridge; base before this depressed; longitudinally carinate behind ridge. Apical angle of the antenniferous tubercles prominent, acute or subacute. Sixth dorsal segment of the male rounded. Genital segment of male foveate.................Tribe *Orsillini* Stal.

D. Basal segment of antennæ surpassing apex of tylus. Head moderately elongate. Rostrum short, its apex scarcely reaching upon the abdomen.

E. Costal margins of hemielytra straight throughout, parallel or converging posteriorly. Eyes prominent, the exposed area back of eyes greater than half of the width of the eyes. Bucculæ less than half the length of gular area. Apex of orifices exteriorly, prominently auriculate *Ortholomus* Stal.

EE. Costal margin of the corium straight only at the base, if at all. Eyes not so prominent. Bucculæ variable. Apex of orifices suddenly abbreviated, rarely subauriculate *Nysius* Dall.

DD. Basal segment of antennæ not reaching apex of tylus. Head much elongated. Rostrum long, reaching to or beyond the middle of the venter *Belonochilus* Uhl.

Key to the Tribes and Genera of the Subfamily Cyminæ.

A. Head without a curved longitudinal sulcus before each ocellus; apical angle of antenniferous tubercles not prominent. Basal segment of antennæ surpassing apex of tylus; fourth segment of antennæ longer than third. Scutellum equilateral with the claval commissure shorter than scutellum. Hemielytra hyaline, provided with few punctures. Orifices exteriorly extended and produced into a tooth at apex.....Tribe *Ischnorrhynchini* Stal.

B. Head porrect, not abruptly deflexed in front. Eyes nearly in contact with front margin of pronotum. Width of head across eyes not much more than half the width of posterior margin of pronotum. Sides of clavus parallel. Costal margin of corium convexly arcuated. . *Ischnorrhynchus* Fieb.

BB. Head deflexed in front, almost vertical. Eyes distant from the anterior margin of pronotum; tumid back of eyes. Width of head across eyes subequal to width of posterior margin of pronotum. Clavus posteriorly widened. Costal margin of corium concave towards base. . . . . . *Ninus* Stal.

AA. Head with a curved longitudinal sulcus before each ocellus. Apical angles of the antenniferous tubercles prominent, acute. Basal segment of the antennæ not surpassing the apex of the tylus; fourth segment shorter than third. Scutellum broader than long. Clavus widened posteriorly. Commissure much longer than scutellum. Hemielytra not hyaline, strongly and densely punctate. . . . . Tribe *Cymini* Stal.

C. Tylus considerably produced before the bucculæ. Rostrum shorter, scarcely reaching middle of mesosternum; second segment extending a little behind anterior margin of prosternum. Mesosternum distinctly grooved. . . . . *Arphnus* Stal.

CC. Tylus not at all or very slightly extended beyond the bucculæ. Rostrum longer, extending to or behind the intermediate coxæ; second segment usually reaching anterior coxæ. Mesosternum not distinctly grooved. . . . . *Cymus* Hahn.

Key to the Genera of the Subfamily Blissinæ.

A. Body elongate; abdomen over twice as long as head and thorax together. Apical margin of corium straight. Anterior coxal cavities closed behind, along the posterior margin of the prosternum. Antennæ longer than head, thorax and scutellum together. Rostrum relatively shorter, its apex not reaching past the middle coxæ. Scutellum subequilateral *Ischnodemus* Fieb.

AA. Body shorter; abdomen less than twice as long as head and thorax together. Apical margin of corium not straight but sinuate before apex of clavus. Coxal cavities open along the posterior margin of the prosternum. Width of head across eyes about one half the diameter of the posterior margin of the prothorax. Antennæ about as long as head, thorax and scutellum together. Rostrum longer, reaching past the middle coxæ. Scutellum broader than long.................*Blissus* Burm.

Key to the Genera of the Subfamily Geocorinæ.

A. Head extended laterally, eyes obviously stalked; inner margins of the eyes strongly converging throughout; the eyes not in contact with the anterior lateral margins of the pronotum. The first segment of the rostrum shorter than the second or subequal to it. Ocelli commonly placed midway between the inner margin of the eye and the middle of the vertex. Head smooth, impunctate..........................*Isthmocoris* McAtee.

AA. Eyes not obviously pedunculate or stalked and commonly contiguous to the anterior lateral margins of the pronotum; inner margins, at least anteriorly, more commonly subparallel. Head, commonly, more or less punctate. Ocelli in most cases placed closer to the inner margin of the eyes than to middle point of the vertex (except in *punctipes* Stal and *flavilineus* Stal). The first segment of the rostrum longer than the second *Geocoris* Fallen.

Subfamily Heterogastrinæ.

Body oblong. Lateral margins of pronotum lightly marginate; posterior margin strongly concave. Anterior femora armed toward apex with a tooth or spine.................*Heterogaster* Schill.

Key to the Genera of the Subfamily Pachygronthinæ.

A. Antennæ short; first segment shortest of all, not attaining apex of head and not clavate at apex; second segment more than twice as long as basal segment. Head strongly deflexed from base; exterior margins of the jugæ not elevated to form a ridge. Scutellum subequilateral, not at all calloused near basal angles. Apical margin of corium toward apex of clavus more or less sinuate, and at outer apical angle obviously rounded. First tarsal segment of the hind legs short, about as long as the second and third taken together.......................*Phlegyas* Stal.

AA. Antennæ longer; first joint longest of all, far surpassing apex of head and clavate or swollen at apex. Head not strongly deflexed; exterior margins of lateral lobes (jugæ) of the head ridged. Scutellum usually longer than wide and with a smooth calloused area near basal angles. Apical margin of corium straight and outer apical angle subacute. First tarsal segment of hind legs longer than second and third together.

B. Scutellum without a median longitudinal, pale, smooth line . . . . *Œdancala* A. and S.

BB. Scutellum with a median, longitudinal, pale, smooth line . . . . *Pachygrontha* Germ.

Key to the Genera of the Subfamily Oxycareninæ.

A. Veins of corium and membrane evident. The corium coarsely but sparingly punctate. Head, pronotum and hemielytra without fine erect hairs. Head, pronotum, scutellum and body beneath not polished . . . . *Crophius* Stal.

AA. Veins of corium and membrane not evident. The general surface of the corium impunctate. Head, pronotum and hemielytra with fine erect hairs. Head, pronotum, scutellum and body beneath polished . . . . *Dycoderus* Uhl.

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